

# MATHS SPRING 1 KNOWLEDGE ORGANISERS



# Year 5 Unit 5 – Multiplication and Division



Product	The result when two numbers are multiplied.	$6 \times 3 = 18$ Factor      Factor      Product
Factor	Numbers we can multiply together to get another number.	
Multiple	The result of multiplying a number by a positive whole number	6, 12, 18, 20, 24 ..... are all multiples of 6
Square Number	To square a number: just multiply it by itself. 4 squared is $4 \times 4 = 16$ . Often shown with a little 2 in the corner like this: $4^2 = 16$ that is said "4 squared equals 16"	$4$ $2^2$ or $2 \times 2 = 4$ $9$ $3^2$ or $3 \times 3 = 9$
Cube Number	The result of using a whole number in a multiplication three times.	$5 \times 5 \times 5 = 125$ so $5^3 = 125$
Prime Numbers	A whole number <b>greater than 1</b> that can not be made by multiplying other whole numbers. They only have 2 factors; one and themselves	

### Multiplying by 10

Th	H	T	O
		7	8

Th	H	T	O
	7	8	0

 $78 \times 10 = 780$ 
  

Th	H	T	O
7	8	0	0

 $78 \times 100 = 7,800$ 

### Prime numbers

- Integer
- Only has 2 factors
- and itself

The first prime number  
The only even prime number

Learn or how-to quick recall...

2, 3, 5, 7, 11, 13, 17, 19, 23, 29...

### Dividing by 10

TTh	Th	H	T	O
4	7	0	0	0

TTh	Th	H	T	O
	4	7	0	0

 $47,000 \div 10 = 4,700$ 
  

TTh	Th	H	T	O
		4	7	0

 $47,000 \div 100 = 470$ 
  

TTh	Th	H	T	O
			4	7

 $47,000 \div 1,000 = 47$

# Year 6 Unit 6

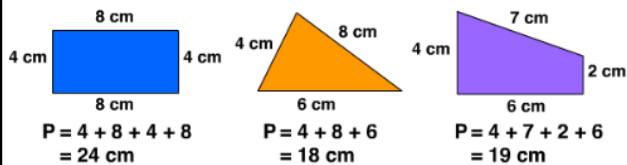
## Area, Perimeter and Volume



### perimeter

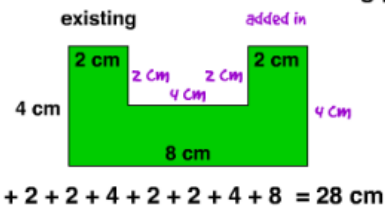
The perimeter of a shape is the sum of the length of all its sides.

#### adding the length of sides



### completing missing lengths

Some lengths may not be shown on examples. Don't forget to add them in when calculating perimeter.



### area

Area can be determined using a grid or a formula.

#### Using a grid

The squares are counted to find an area.

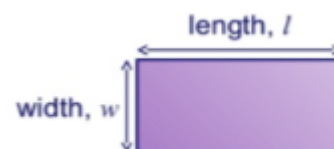


Area is measured in **square units**

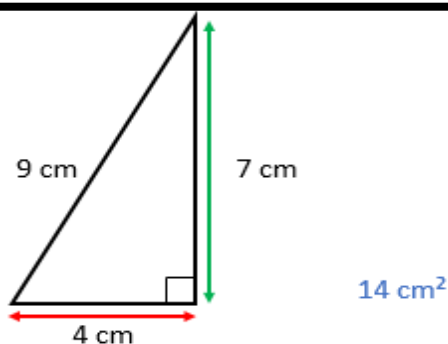
For example, we use  $\text{mm}^2$ ,  $\text{cm}^2$  or  $\text{m}^2$

The <sup>2</sup> tells us that there are 2 dimensions, length and width.

We can find the area of a rectangle by multiplying the **length** and the **width** of the rectangle together.



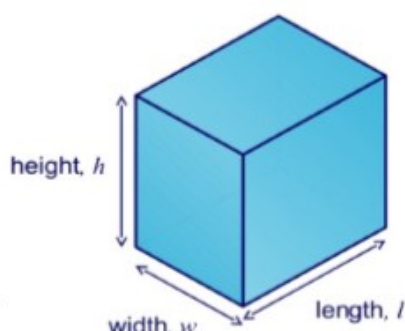
$$\begin{aligned} \text{Area of a rectangle} \\ &= \text{length} \times \text{width} \\ &= lw \end{aligned}$$



$$\text{Area of a triangle} = \frac{\text{Base} \times \text{Perpendicular height}}{2}$$

$$\begin{aligned} \text{Area of a triangle} &= \frac{1}{2} \times \text{Base} \times \text{Perpendicular height} \\ &= \frac{1}{2} \times 4 \times 7 \end{aligned}$$

We can find the volume of a cuboid by multiplying the area of the base by the height.



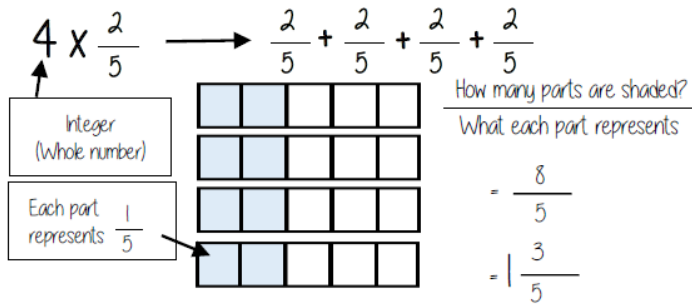
$$\begin{aligned} \text{Volume of a cuboid} \\ &= \text{length} \times \text{width} \times \text{height} \\ &= lwh \end{aligned}$$

# Year 6 Unit 7

## Fractions B



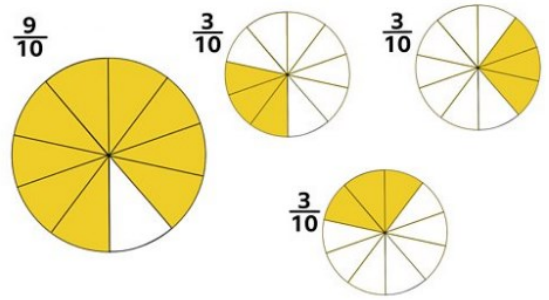
### Multiplying by an integer=repeated addition



### Dividing a fraction by an integer

There is  $\frac{9}{10}$  of a pizza left and we need to share it equally between 3 people.

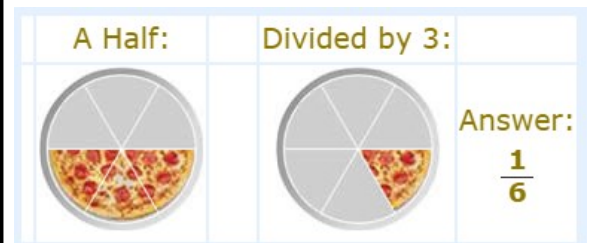
As a fraction, how much pizza will each person receive?



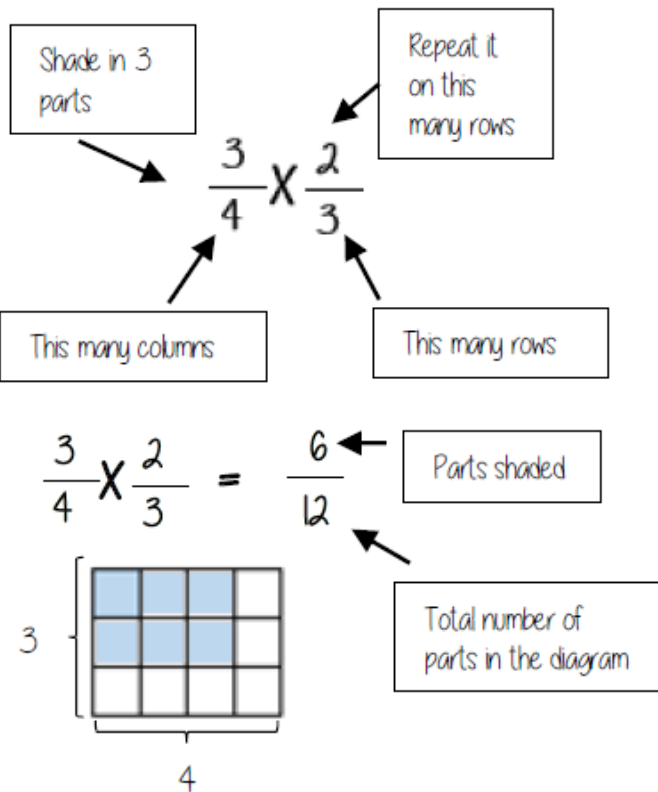
We started with  $\frac{9}{10}$  and then shared out the  $\frac{9}{10}$  to 3 people.

$9 \div 3 = 3$  so each person gets  $\frac{3}{10}$

Does  $\frac{1}{2} \div 3$  really equal  $\frac{1}{6}$  ?

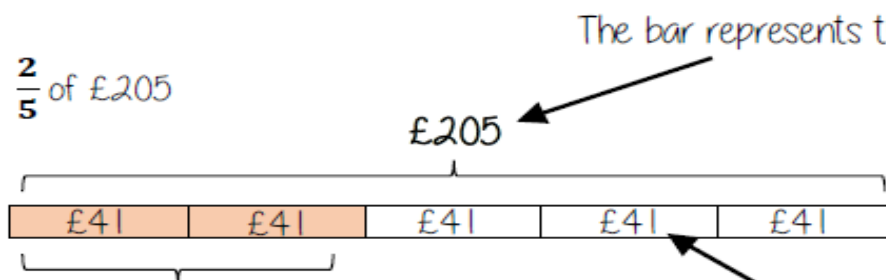


### Multiplying non-unit fractions



### Finding a fraction of a given amount

Find  $\frac{2}{5}$  of £205



2 out of the 5 equal parts  
 $2 \times £41 = \underline{£82}$

$£205 \div 5 = £41$

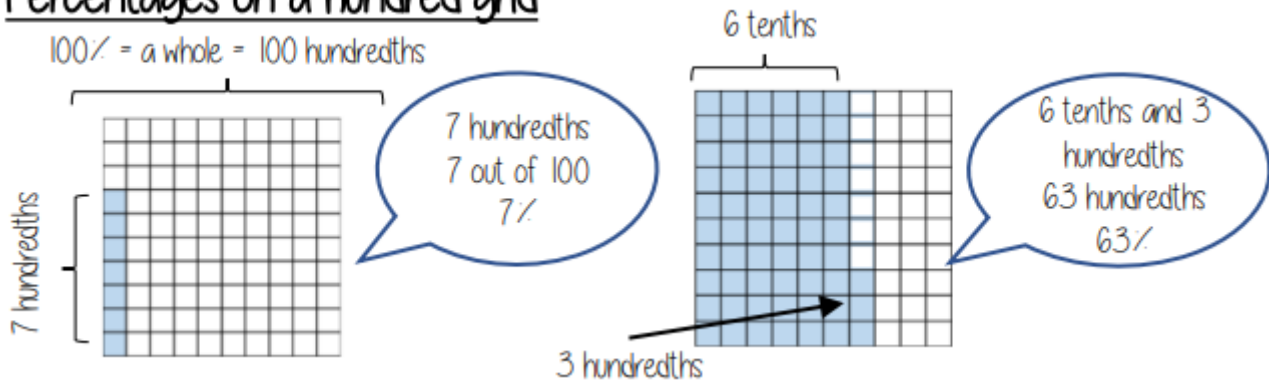
Each part of the bar model represents £41

# Year 6 Unit 8 Equivalence

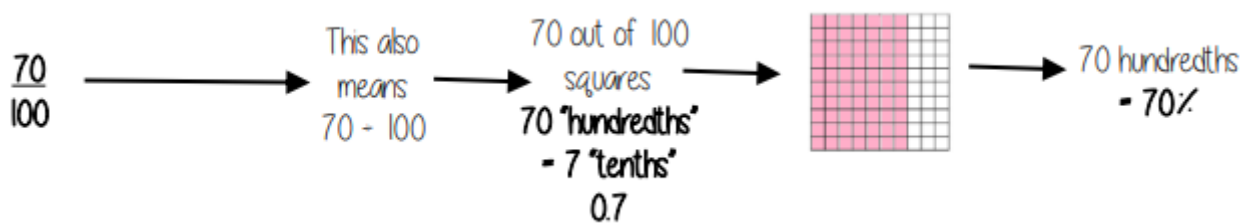


Percentage means out of 100

## Percentages on a hundred grid

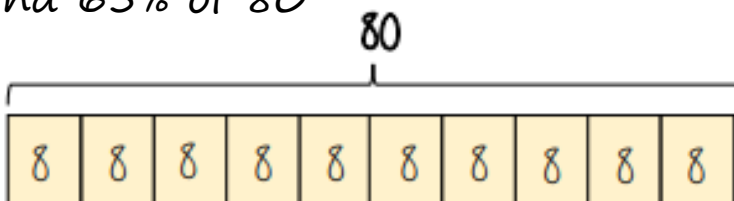


## Equivalence



Find the percentage of an amount using mental methods.

Find 65% of 80



For bigger percentages it is sometimes easier to take away from 100%

Method 1

$$\begin{aligned} 65\% &= (10\% \times 6) + 5\% \\ &= (8 \times 6) + 4 \\ &= 54 \end{aligned}$$

Method 2

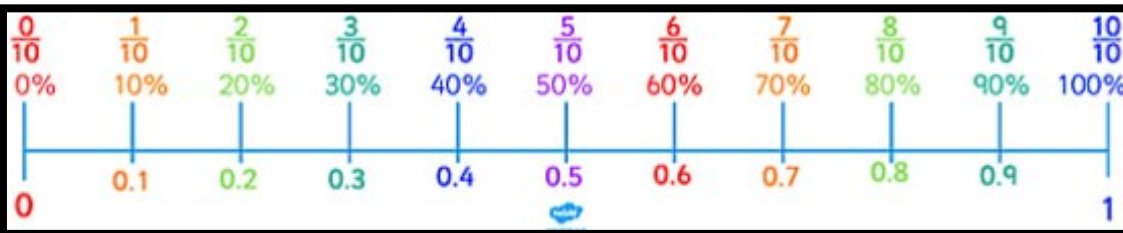
$$\begin{aligned} 65\% &= 50\% + 10\% + 5\% \\ &= 40 + 10 + 4 \\ &= 54 \end{aligned}$$

# Year 7 -Unit 4

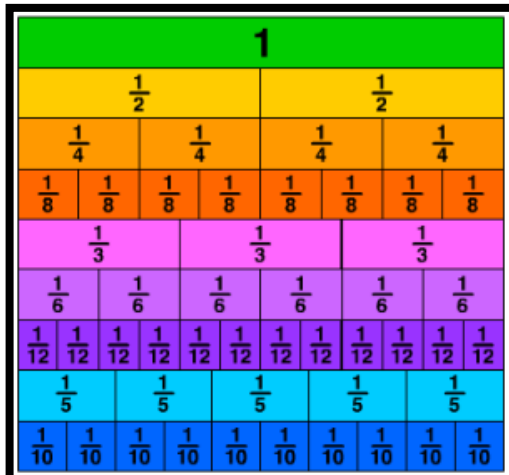


## Fraction, Decimal and Percentage Equivalence

Equivalence	Having the same value	 $\frac{1}{2}$ $\frac{2}{4}$ $\frac{8}{16}$ $1 \div 2 = 0.5$ $2 \div 4 = 0.5$ $8 \div 16 = 0.5$
Percentage	Percent come from the Latin term 'per centum' meaning per hundred.	 1 25 100 Parts per 100 The symbol is % Example: 25% means 25 per 100 (25% of this box is green)
Proper Fraction	A fraction smaller than one whole	 $\frac{2}{3}$ $\frac{3}{10}$
Improper Fraction	A fraction greater than one whole	 $\frac{8}{5}$
Mixed Number	A number written as a whole number and a proper fraction	 $1\frac{3}{4}$ $\frac{7}{4}$



Thousands	Hundreds	Tens	Ones	Decimal Point	Tenths	Hundredths	Thousandths
				●			



1	1.0	100%
$\frac{3}{4}$	0.75	75%
$\frac{2}{3}$	0.6	66 $\frac{2}{3}$ %
$\frac{1}{2}$	0.5	50%
$\frac{1}{3}$	0.3	33 $\frac{1}{3}$ %
$\frac{1}{4}$	0.25	25%
$\frac{1}{5}$	0.2	20%
$\frac{1}{8}$	0.125	12 $\frac{1}{2}$ %
$\frac{1}{10}$	0.1	10%
$\frac{1}{100}$	0.01	1%

# Year 7 Unit 5

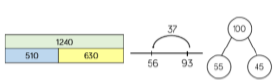
## Applying Addition and Subtraction



Addition	The joining of two or more numbers or quantities.	In <b>addition</b> two or more numbers are joined to get one number which is the <b>sum</b> or the <b>total</b> .
Sum Total	The result of adding; the whole amount	
Subtraction	When one quantity is taken away from another	80 <b>subtract</b> 30 is 50. The <b>difference</b> between 80 and 30 is 50
Difference	The result of subtracting one number from another	
Commutative	Numbers can be added in any order, but in subtraction the order is important.	$a + b = b + a$ $6 + 2 = 8$ or $2 + 6 = 8$
Associative	In addition, no matter how numbers are grouped, the answers will be same.	 $(6 + 3) + 4 = 6 + (3 + 4)$
Inverse	The reverse or opposite of an operation.	 $4 + 2 = 6$ $2 + 4 = 6$ $6 - 4 = 2$ $6 - 2 = 4$
Perimeter	The distance around a polygon.	 Perimeter = $2L + 2W$ Same as: $L + L + W + W$
Profit	Profit occurs when an item is sold for more than it cost to purchase.	
Loss	Loss occurs when an item is sold for less than it cost to purchase.	

### Addition and Subtraction

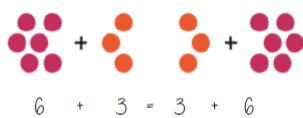
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Modelling methods for addition/ subtraction

- Bar models
- Number lines
- Part/ Whole diagrams

Addition is commutative



The order of addition does not change the result

Subtraction the order has to stay the same

$$360 - 147 = 360 - 100 - 40 - 7$$

- Number lines help for addition and subtraction
- Working in 10's first aids mental addition/ subtraction
- Show your relationships by writing fact families

Formal written methods

	H	T	O
+	1	8	7
+	5	4	2

	H	T	O
		4	2
-		2	4
			9

Remember the place value of each column. You may need to move 10 ones to the ones column to be able to subtract

### Addition and Subtraction of decimals

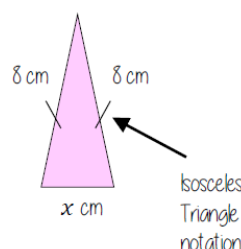
4	.	3	8
7	.	9	0
			+

0 can be used to fill empty places with value

The decimal place acts as the placeholder and aligns the other values

### Perimeter problems

Perimeter is the length around the outside of a polygon



The triangle has a perimeter of 25cm. Find the length of  $x$

$$8\text{cm} + 8\text{cm} + x\text{cm} = 25\text{cm}$$

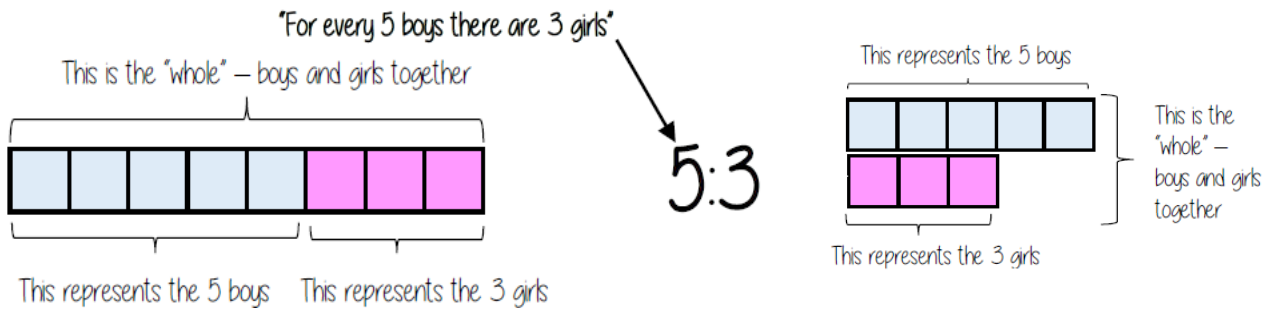
$$16\text{cm} + x\text{cm} = 25\text{cm}$$

$$x\text{cm} = 9\text{cm}$$

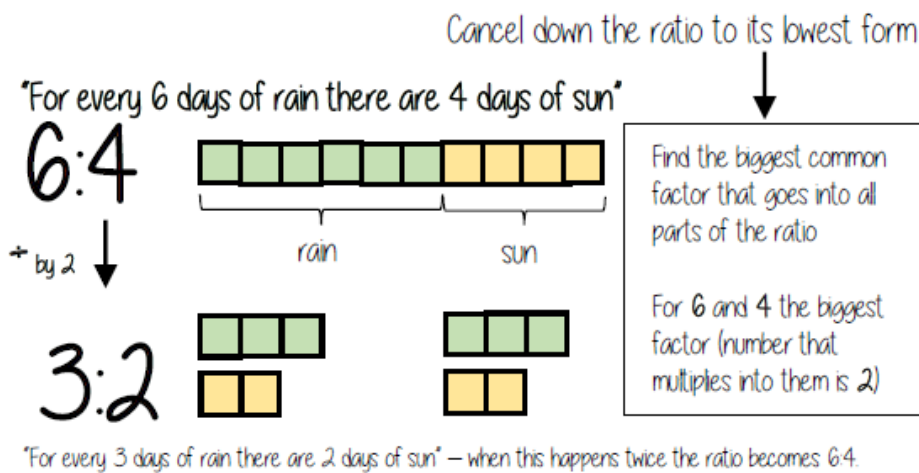
# Year 8 Unit 4 – Ratio



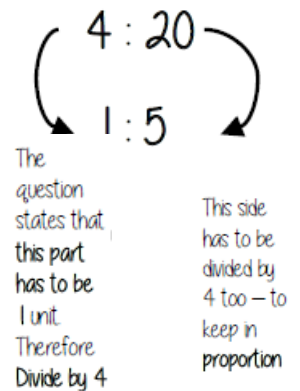
## What is a ratio?



## Simplifying a ratio



## Writing a ratio in form 1:n

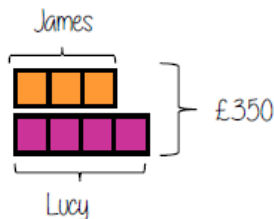


## Dividing into a given ratio

James and Lucy share £350 in the ratio 3:4.  
Work out how much each person earns

### Model the Question

James: Lucy  
3 : 4



### Find the value of one part

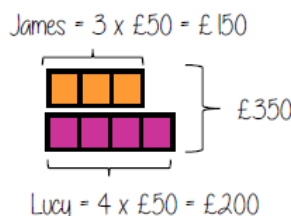
Whole: £350  
7 parts to share between  
(3 James, 4 Lucy)

$$£350 \div 7 = £50$$

□ = one part  
= £50

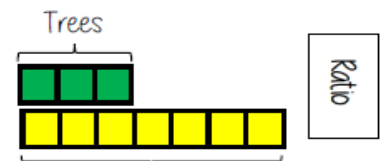
### Put back into the question

James: Lucy  
(x 50) 3 : 4 (x 50)  
↙ £150:£200 ↘



## Ratio and fractions

Trees: Flowers  
3 : 7



There are 3 parts for trees

Fraction of trees

Fraction of trees

$$\frac{\text{Number of parts of in group}}{\text{Total number of parts}} = \frac{3}{10}$$

Tree parts 3 + Flower parts 7 = 10

## Order is important

"For every dog there are 2 cats"



1:2

The ratio has to be written in the same order as the information is given

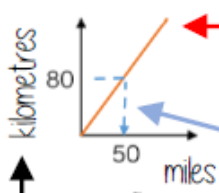
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# Year 8 Unit 5 Proportion and Scale



Proportion	A statement that links two ratios
Variable	A part where the value can be changed
Scale Factor	The multiple that increases or decreases a shape in size
Conversion	The process of changing one variable to another

## Conversion Graphs



Labelling of both axes is vital

This is always a straight line because as one variable increases so does the other at the same rate

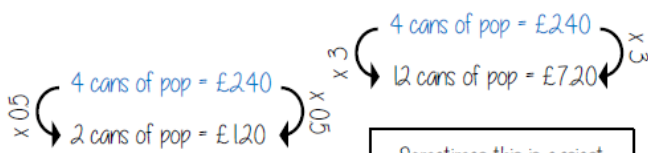
To make conversions between units you need to find the point to compare – then find the associated point by using your graph  
Using a ruler helps for accuracy  
Showing your conversion lines help as a "check" for solutions

## Direct Proportion

As one variable changes the other changes at the same rate



4 cans of pop = £2.40



This multiplier is the same in the same way that this would be for ratio

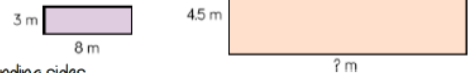
Sometimes this is easiest if you work out how much one unit is worth first  
e.g. 1 can of pop = £0.60

## Ratio in similar shapes

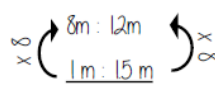
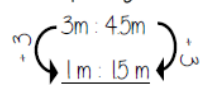


Angles in similar shapes do not change.  
e.g. if a triangle gets bigger the angles can not go above  $180^\circ$

The two rectangles are similar.



Corresponding sides



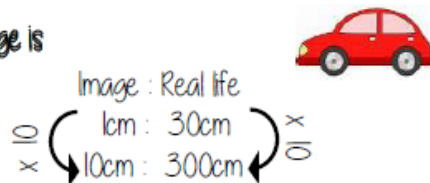
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## Interpreting Scale Drawings

A picture of a car is drawn with a scale of 1:30

For every 1cm on my image is 30cm in real life

The car image is 10cm



The car in real life is 210cm

